^{63}Cu(^{16}O,αpnγ) 1991Ka16

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh and Jun Chen	NDS 158, 1 (2019)	16-May-2019

1991Ka16: E=69 MeV. Enriched target. HPGe, BGO, and sum-multiplicity spectrometer. Measured Eγ, Iγ, $\gamma\gamma$, $\gamma\gamma(\theta)$(DCO).

^{73}Se Levels

E(level)[†]	J$^{\pi}$[‡]	T$_{1/2}$	Comments
0.0[#]	9/2$^+$		
25.71[&] *4*	3/2$^-$	39.8 min *17*	E(level),T$_{1/2}$: from Adopted Levels. Additional information 1.
150.9[a] *3*	5/2$^-$		
295.44[@] *25*	7/2$^+$		
505.2[&] *4*	7/2$^-$		
804.5[a] *4*	9/2$^-$		
971.6[#] *3*	13/2$^+$		
999.38[@] *24*	11/2$^+$		
1179.5[&] *5*	11/2$^-$		
1552.4[a] *5*	13/2$^-$		
1863.4[@] *4*	15/2$^+$		
2002.4[&] *5*	15/2$^-$		
2015.4[#] *4*	17/2$^+$		
2433.0[a] *5*	17/2$^-$		
2872.5[@] *4*	19/2$^+$		
2950.3[&] *5*	19/2$^-$		
3172.0[#] *5*	21/2$^+$		
3440.9[a] *5*	21/2$^-$		
3914.4[@] *5*	23/2$^+$		
4013.2[&] *6*	23/2$^-$		
4386.4[#] *6*	25/2$^+$		
4590.4[a] *6*	25/2$^-$		
5221.2[&] *9*	27/2$^-$		
5636.4[#] *6*	29/2$^+$		
5854.8[a] *10*	29/2$^-$		
6528.2[&] *13*	31/2$^-$		
7014.5[#] *7*	33/2$^+$		
7235.8[a] *14*	(33/2$^-$)		

[†] From least-squares fit to Eγ data, assuming uncertainty of 0.3 keV when Eγ quoted to nearest tenth of a keV, 1 keV otherwise.
[‡] As proposed by 1991Ka16 based on previous assignments, DCO data and band structures in their work.
[#] Band(A): 7/2$^+$ band,α=+1/2.
[@] Band(a): 7/2$^+$ band,α=−1/2.
[&] Band(B): 3/2$^-$ band,α=−1/2.
[a] Band(b): 3/2$^-$ band,α=+1/2.

^{63}Cu(^{16}O,αpnγ) 1991Ka16 (continued)

γ(^{73}Se)

Model-dependent (M1+E2) mixing ratios deduced by 1991Ka16 from γ-branching ratios for 12 transitions are given under comments. Sign of δ is not given in such calculation.

E_γ	I_γ	E_i(level)	J_i^π	E_f	J_f^π	Mult.[†]	α[‡]	Comments
(25.71 *4*)		25.71	3/2⁻	0.0	9/2⁺	E3	5250 *90*	E_γ,Mult.: from Adopted Gammas.
125.1	100 *3*	150.9	5/2⁻	25.71	3/2⁻	D+Q		DCO=0.60 *20*
295.4	3.9 *13*	295.44	7/2⁺	0.0	9/2⁺			
299.0	12.5 *11*	804.5	9/2⁻	505.2	7/2⁻	D+Q		DCO=0.55 *36* δ(E2/M1)=0.61 *24*.
299[#]		3172.0	21/2⁺	2872.5	19/2⁺	D+Q		DCO=0.60 *20*
354.1	27.7 *21*	505.2	7/2⁻	150.9	5/2⁻	D+Q		DCO=0.49 *13* δ(E2/M1)=0.18 *3*.
373	12 *5*	1552.4	13/2⁻	1179.5	11/2⁻	D+Q		DCO=0.32 *12* δ(E2/M1)=1.04 *6*.
375		1179.5	11/2⁻	804.5	9/2⁻			
430.6	4.5 *5*	2433.0	17/2⁻	2002.4	15/2⁻	D+Q		DCO=0.33 *23* δ(E2/M1)=0.17 *24*.
449.9	7.5 *6*	2002.4	15/2⁻	1552.4	13/2⁻			DCO=0.87 *42* δ(E2/M1)=0.19 *5*.
472[#]		4386.4	25/2⁺	3914.4	23/2⁺			
480		505.2	7/2⁻	25.71	3/2⁻			
490.4	2.7 *3*	3440.9	21/2⁻	2950.3	19/2⁻			δ(E2/M1)=0.11 *6*.
517.3	9.1 *5*	2950.3	19/2⁻	2433.0	17/2⁻			δ(E2/M1)=0.15 *4*.
572.7	4.1 *3*	4013.2	23/2⁻	3440.9	21/2⁻			δ(E2/M1)=0.07 *3*.
578.0	2.6 *14*	4590.4	25/2⁻	4013.2	23/2⁻			δ(E2/M1)=0.055 *55*.
632[#]		5221.2	27/2⁻	4590.4	25/2⁻			
633[#]		5854.8	29/2⁻	5221.2	27/2⁻			
653.8	31.9 *12*	804.5	9/2⁻	150.9	5/2⁻	Q		DCO=1.00 *26*
674.3	29 *3*	1179.5	11/2⁻	505.2	7/2⁻	(Q)		DCO=0.96 *41*
703.9	8.7 *25*	999.38	11/2⁺	295.44	7/2⁺			
742.5	14.4 *10*	3914.4	23/2⁺	3172.0	21/2⁺			
747.9	31 *3*	1552.4	13/2⁻	804.5	9/2⁻	(Q)		DCO=0.74 *40*
823.0	28.7 *22*	2002.4	15/2⁻	1179.5	11/2⁻			
856.9	5.7 *9*	2872.5	19/2⁺	2015.4	17/2⁺			δ(E2/M1)=0.08 *5*.
864	13.9 *25*	1863.4	15/2⁺	999.38	11/2⁺			
880.6	31.4 *25*	2433.0	17/2⁻	1552.4	13/2⁻	(Q)		DCO=0.68 *21*
891.8	7.4 *14*	1863.4	15/2⁺	971.6	13/2⁺			δ(E2/M1)=0.15 *11*.
947.9	19.9 *17*	2950.3	19/2⁻	2002.4	15/2⁻	(Q)		DCO=1.20 *52*
971.6	42 *3*	971.6	13/2⁺	0.0	9/2⁺			
999.4	10.1 *10*	999.38	11/2⁺	0.0	9/2⁺			δ(E2/M1)=0.43 *31*.
1008.0	12.0 *12*	3440.9	21/2⁻	2433.0	17/2⁻			
1009.0		2872.5	19/2⁺	1863.4	15/2⁺			
1041.7		3914.4	23/2⁺	2872.5	19/2⁺			
1043.8	47 *4*	2015.4	17/2⁺	971.6	13/2⁺	Q		DCO=1.00 *25*
1063.0	6.4 *10*	4013.2	23/2⁻	2950.3	19/2⁻			
1148.9	5.1 *9*	4590.4	25/2⁻	3440.9	21/2⁻			
1156.9	29.6 *26*	3172.0	21/2⁺	2015.4	17/2⁺			DCO=0.59 *20*
1206		5221.2	27/2⁻	4013.2	23/2⁻			
1214.4	16 *3*	4386.4	25/2⁺	3172.0	21/2⁺			
1249.9	11.9 *20*	5636.4	29/2⁺	4386.4	25/2⁺			
1265[#]		5854.8	29/2⁻	4590.4	25/2⁻			
1307[#]		6528.2	31/2⁻	5221.2	27/2⁻			

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^{63}Cu(^{16}O,αpnγ) 1991Ka16 (continued)

γ(^{73}Se) (continued)

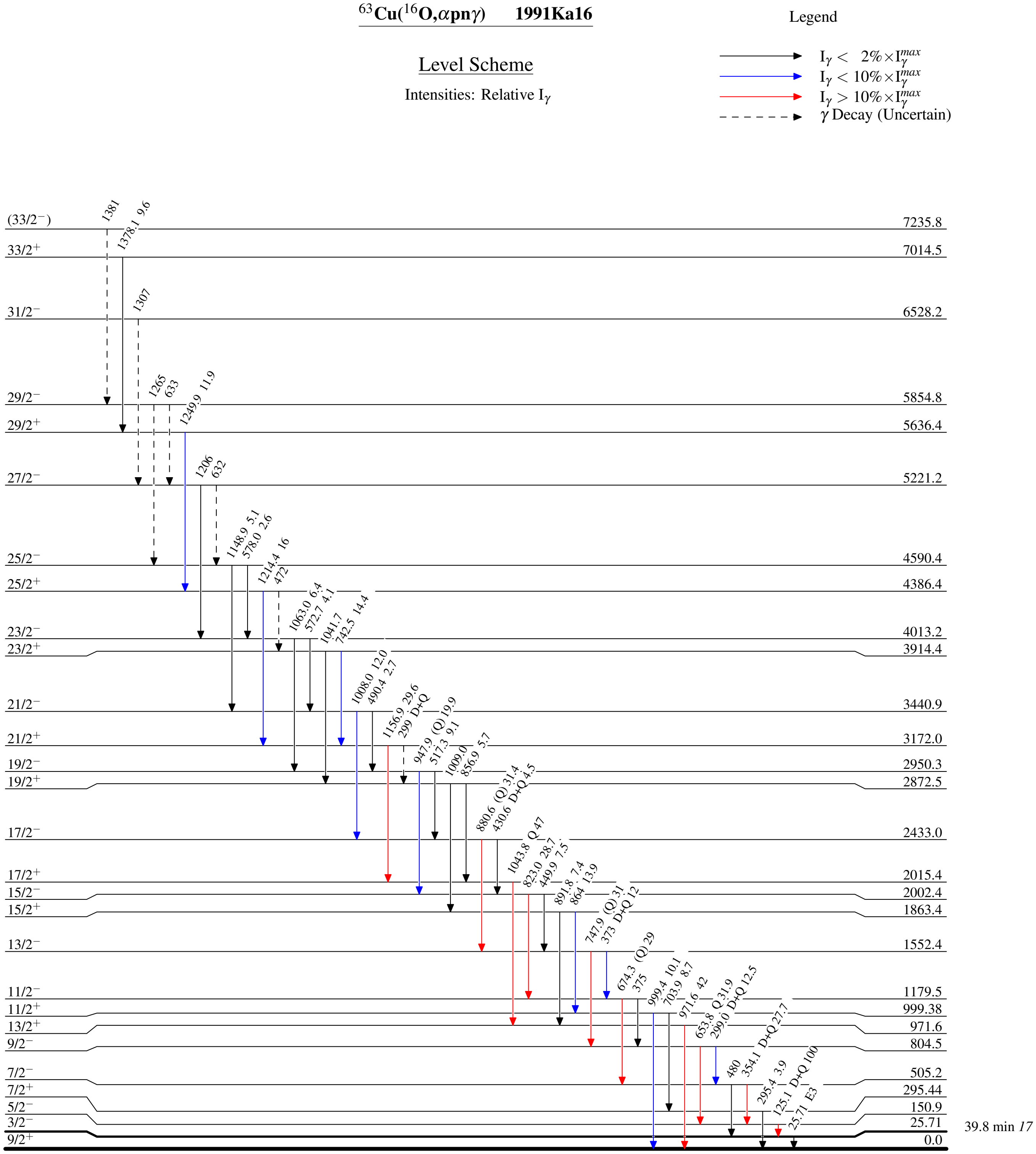
E_γ	I_γ	E_i(level)	J^π_i	E_f	J^π_f
1378.1	9.6 *21*	7014.5	$33/2^+$	5636.4	$29/2^+$
1381[#]		7235.8	$(33/2^-)$	5854.8	$29/2^-$

[†] From DCO ratio. With gate on stretched quadrupole transition, expected DCO value is unity for stretched quadrupole transitions, and 0-2 for unstretched dipole+quadrupole (M1+E2) transitions. Mult=Q indicates ΔJ=2, quadrupole (most likely E2), and mult=D+Q indicates ΔJ=1 transition, most likely M1+E2.

[‡] Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.

[#] Placement of transition in the level scheme is uncertain.

$^{63}Cu(^{16}O,\alpha pn\gamma)$ 1991Ka16



$^{73}_{34}Se_{39}$

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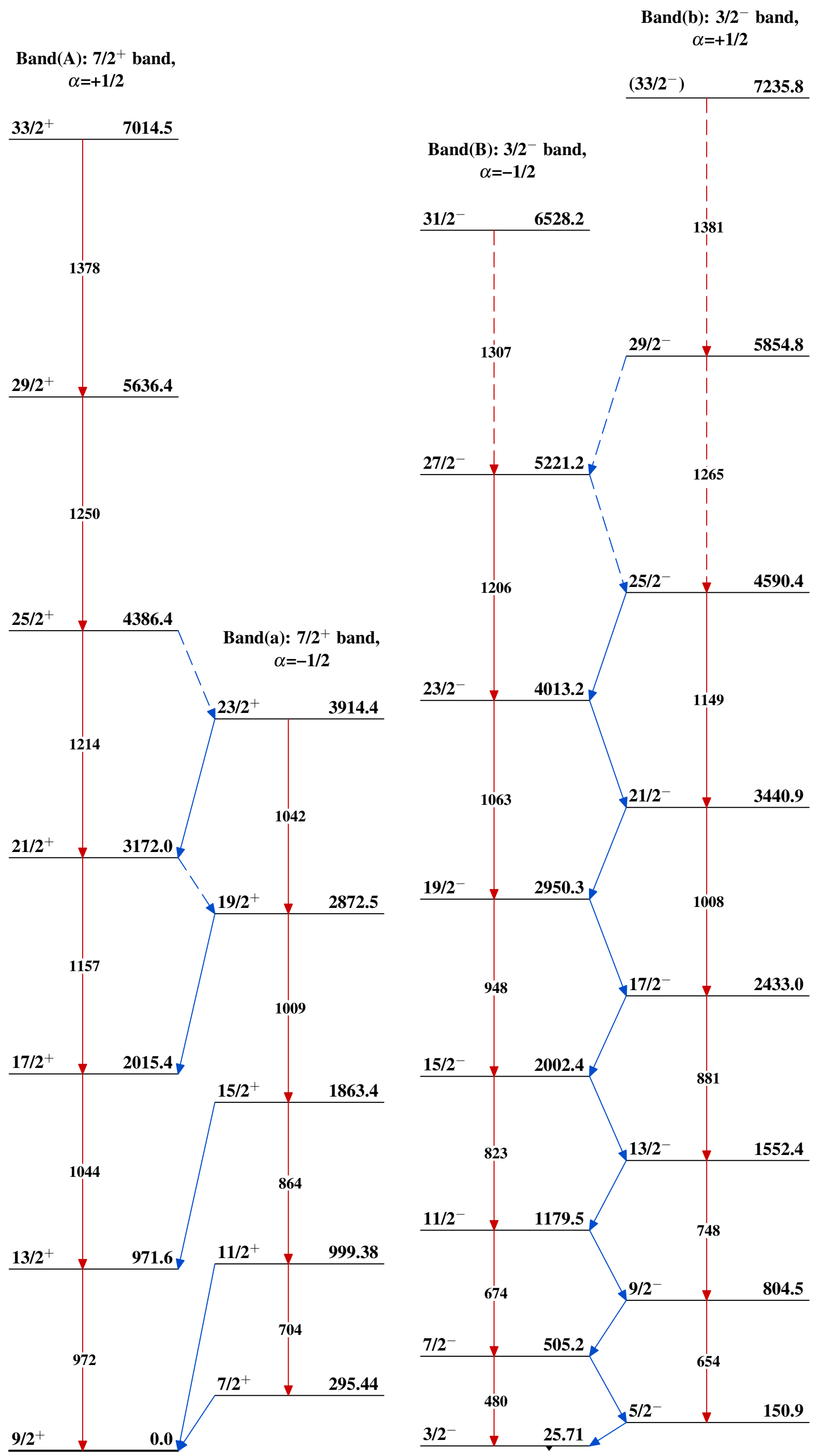

$^{73}_{34}Se_{39}$